IN THE SPECIFICATION:

The specification as amended below with replacement paragraphs shows added text with underlining and deleted text with ~~strikethrough~~.

Please REPLACE paragraph [0034] on page 7 with the following amended paragraph:

[0034] According to this embodiment, elements having element value 1 of each cycle forming group are vertically shifted such that only the values of the rows are changed while ~~element~~ the values of the ~~column~~ columns are retained, thereby achieving the same effect as that achieved by horizontally shifting elements having element value 1 of each cycle forming group.

Please REPLACE paragraph [0037] on page 7 with the following amended paragraph:

[0037] FIG. 3A shows a parity check matrix C in which ~~each~~ two groups of four elements indicated by ○ and □~~,~~ each generate a cycle-4 status. ~~Four~~ The four elements indicated by □ belong to a first cycle forming group, and the other four elements indicated by ○ belong to a second cycle forming group. Elements ~~which~~ having element value 1 that do not belong to either the first ~~and~~ cycle forming group or the second cycle forming ~~groups and have element value 1~~ group are indicated by ~~a symbol~~ Δ.

Please REPLACE paragraphs [0039]-[0042] on pages 8-9 with the following amended paragraphs:

[0039] As described above, the matrix element shifting unit 133 shifts ~~an~~ one element having element value 1 of the first cycle forming group ~~of two cycle forming groups~~ shown in FIG. 3B~~,~~ to a row in which two elements having element value 1 of the second cycle forming group exist~~,~~ ~~while element values of rows are changed on the same~~ by changing the value of the row of the one element of the first cycle forming group while retaining the value of the column of the one element of the first cycle forming group. One element of the two elements having element value 1 of the second cycle forming group existing ~~on~~ in the row to which the one element of the first cycle forming group ~~is~~ was shifted~~,~~ is shifted to the row in which ~~elements~~ the one element of the first cycle forming group that was shifted originally ~~exist~~ existed.

[0040] Referring to FIG. 3B, the element having element value 1 of the ~~first~~ second cycle forming group~~, the element~~ positioned at (1, 3), cannot be shifted to (1, 1) because ~~the~~ an element having element value 1 already exists ~~thereat~~ at (1, 1). The matrix element shifting unit 133 shifts ~~elements constituting~~ an element having element value 1 of a cycle forming group to a desired position, or to another position at which there is no element having element value 1 if ~~other elements~~ an element having element value 1 ~~exist~~ already exists at the desired position. The matrix element shifting unit 133 shifts another ~~elements~~ element having element value 1 if there is no position at which there is no element having element value 1~~,~~ to which elements having element value 1 of a particular cycle forming group can be shifted.

[0041] FIG. 3C shows ~~the~~ a case in which ~~an~~ the element having element value 1 of the first cycle forming group~~, the element~~ positioned at (2, 3)~~,~~ is shifted to (3, 3), and ~~the element value 1 of~~ one element of the two elements having element value 1 of the second cycle forming group existing on ~~a third~~ row 3 to which the element of the first cycle forming group ~~is~~ was shifted, that is, the ~~one~~ element having element value 1 positioned at ~~(3, 2)~~ (3,1), is shifted to ~~(2, 2)~~ (2,1). ~~In this case, as indicated by a dotted line,~~ This results in there ~~are~~ being four elements having element value 1 forming four vertexes of a rectangle indicated by a dashed line, that is, the four elements having element value 1 positioned at (1, 1), (1, 5), (2, 1) and (2, 5), thereby generating a new cycle forming group. Therefore, the element ~~positioned at (2, 3)~~ having element value 1 of the first cycle forming group positioned at (2, 3) cannot be ~~vertically~~ shifted to (3, 3).

[0042] FIG. 3D shows ~~the~~ a case in which ~~an~~ the element having element value 1 of the first cycle forming group~~, the element~~ positioned at (2, 5)~~,~~ is shifted to (3, 5), and ~~the element value 1 of~~ one element of the two elements having element value 1 of the second cycle forming group existing on ~~a third~~ 3 row to which the element of the first cycle forming group ~~is~~ was shifted, that is, the ~~one~~ element having element value 1 positioned at (3, 2), is shifted to (2, 2). ~~As indicated by a dotted line, since~~ This also results in there ~~are~~ being four elements having element value 1 forming four vertexes of a rectangle indicated by a dashed line, that is, ~~(~~the elements having element value 1 positioned at (1, 1), (1, 5), (3, 1) and (3,5), ~~)~~ thereby also generating a new cycle forming group ~~is generated~~. Therefore, the element ~~positioned at (2, 5)~~ having element value 1 of the first cycle forming group positioned at (2, 5) cannot be shifted to (3, 5).

REPLACE paragraph [0047]-[0048] on pages 9-10 with the following amended paragraphs:

[0047] The LDPC coding unit 150 determines a matrix X satisfying the following equation:

~~H×M = 0~~

H×X = 0

wherein X is ~~a~~ an (m+p) ×1 matrix

$$\begin{pmatrix} k_1 \\ k_2 \\ \cdot \\ \cdot \\ \cdot \\ k_m \\ x_1 \\ x_2 \\ \cdot \\ \cdot \\ \cdot \\ x_p \end{pmatrix}$$

[0048] Among the elements of the matrix X, k_1, k_2,..., k_m are ~~message words of~~ the m bits of the m-bit message word k_i, and x_1, x_2,..., x_p which are p bits of parity information ~~of p bits~~. Since the matrix H and k_i (i=1, 2... m) ~~among elements~~ of the matrix ~~H and matrix~~ X ~~is~~ are known, the parity information x_i (i=1, 2... p) of the matrix X can be determined using the equation.